Original Research Article

Enhancing Inclusive Education for Children with Dysgraphia: Assessing the Knowledge of Basic School Teachers in the Nkwanta South Municipality in Ghana

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ABSTRACT

Introduction: Children with learning disabilities experience difficulty in acquiring basic academic competencies compared to those without disability, and dysgraphia is not excluded.

Aim: This study assesses the knowledge of teachers on children with dysgraphia in Ghana.

Methods: The study adopted a cross-sectional study design with quantitative approach. A stratified probability sampling technique was used to select 98 teachers. The study employed a structured questionnaire to interview respondents in eight (8) communities. Data was analyzed using the Statistical Package for Social Sciences (SPSS) version 17.

Results: The study found that 94% of basic schoolteachers possess moderate knowledge of dysgraphia. Again, of the 98 respondents, the majority gave 'cannot tell /neutral' responses on knowledge of characteristics of dysgraphia: awkward pen or pencil grip (65/98 respondents), spelling errors (74/98), difficulty getting thoughts on paper (53/98), and taking longer to complete a written sentence (68/98). However, respondents have good knowledge of dysgraphia children producing bad writing (89/98), unfinished words (86/98), a mixture of upper- and lower-case letters (79/98), irregular spacing of words or letters (82/98), and writing that is either too small or too large (56/98).

Conclusion: Few Teachers have adequate knowledge of the characteristics of children with dysgraphia.

Limitations: The study would have been interesting if children with dysgraphia were directly involved, where they would be asked to write sentences, and a video version was taken and published with this manuscript.

Keywords: Enhancing; Inclusive Education; Children with Dysgraphia; Assessing Knowledge of Basic School Teachers; Ghana

INTRODUCTION

While the challenges of inclusive education for children with disabilities are a global issue, resource constraints make it more complicated in the Global South. The acknowledgement of the exclusion has been accompanied by advocacy for the elimination of the inequities (Lebona, 2013; Rachamalla & Rafi, 2016; Dayan, 2017; Hasan, Halder, and Debnath, 2018). In the case of Ghana, there have been some gains in terms of the formulation of inclusive education policy (Ametepee & Anastasiou, 2015; Butakor, Amapdu & Suleiman, 2018). However, inclusive education interventions have mainly targeted the major groups within the disabled population, notably, the visually impaired, the deaf and hard of hearing, those with intellectual disabilities, and the physically disabled (Opoku, et al., 2015). Thus, so far, the inclusive education needs of the minority groups of children with learning disabilities, such as children with dysgraphia, have not received adequate attention (Special Attention Project, 2011). Dysgraphia is conceived as a writing disorder or a deviation from the standard mode of writing in each context (Chung and Patel, 2015). This may manifest in a slow rate of writing, spelling difficulties, and problems with syntax and composition. Teachers are one of the immediate relations who are connected with such children, especially at the basic school level. This study, therefore, sought to examine the knowledge and competencies of basic schoolteachers in meeting the inclusive education needs of children with dysgraphia in the Nkwanta South Municipality in Ghana. Few studies have been done on assessing teachers' competence and knowledge of children with learning disabilities such as dysgraphia.

A study conducted in Kenya by Madrine (2015) found that the majority of the teachers did not have adequate knowledge of teaching learners with dysgraphia. The study further reported that 75% of teachers strongly agreed that teachers required training on 'special needs education' to enable them to identify learners with dysgraphia and give them support.

A similar study conducted in India reported that most of the teachers (45%) had moderate-level knowledge of learning disability, and 21.5% had an inadequate knowledge level of learning disability, while 33.5% of schoolteachers had adequate knowledge of learning disability (Madhamani & Joseph, 2021). The study further showed that 73% of the teachers admitted they had seen children with symptoms of learning disabilities. On the assessment of curing learning disability, 88% of the teachers mentioned that learning disability is curable.

Teachers' knowledge on the accessibility of inclusive educational systems, the impact of sensory impairments on learning, attitudinal barriers, inclusive pedagogies, assessment techniques for identification of learning disabilities, and inclusive education policy dynamics is key. For instance, studies on attitudinal barriers and inclusive education for children with learning disabilities have shown that the actions and reactions of teachers remain crucial to their academic performance (Shari & Vranda, 2016). Boer, Pijl & Minnaert (2010) have made a distinction between the cognitive, affective, and behavioural components of teachers' attitudes, which borders on teachers' beliefs or knowledge about educating children with learning disabilities, their emotional reactions toward children with learning disabilities, and their physical reactions.

In relation to the above assertion, Jenson (2018) mentioned that these attitudes are shaped by several contextual factors, including child-related, teacher-related, educational, and environmental-related variables. Furthering this, Beyene and Tizazu (2010) observed that teacher-related variables, such as gender, age, level of experience, duration of contact with children with learning disabilities, training, and educational background, have significant implications in the lives of children with dysgraphia.

Research outcomes have shown that with competent teachers, appropriate support services could improve the plight of children with dysgraphia. Crouch and Jakubecy

(2007) and Khan et al. (2017), for example, observed that the application of appropriate remediation strategies can improve muscle strength, control of fine motor skills, and hand and eye coordination, thereby improving handwriting skills. These remediation techniques may include, but are not limited to, playing with clay to develop fine motor control and strengthen hand muscle; following mazes or dots to practice hand and eye coordination; tracing letters or pictures to develop hand and eye coordination; stretching rubber bands; shaking hands and fingers rapidly; and opening and closing fists rapidly. Again, the above practice, coupled with accommodating strategies such as additional time allowance, reduction in the volume and nature of written assignments, innovative assessment criteria for certain assignments, and the provision of relevant assistive technology devices, could improve the academic performance of children with dysgraphia. These are useful when teachers have adequate basic knowledge of how to handle children with dysgraphia. The outcome of this study may inform education and health policy for basic school children with learning disabilities such as dysgraphia.

METHODS

Study Setting and Approach

The study setting for the research was the Nkwanta South Municipality. It was conducted between 2019 and 2020. It adopted a quantitative study involving teachers at the basic school level.

Profile of the Study Area

The study was conducted in eight communities in the Nkwanta South Municipality of Ghana between 2019 and 2020. These communities were Bonakye North, Bonakye South, Brewaniase, Kechebi, Nkwanta East, Nkwanta West, Salifu, and Tutukpene. The Municipality is between latitudes 7′ 30o and 8′ 45o North and longitude 0′10o and 0′45o East and bounded to the north by Nkwanta North District, to the south by the Kadjebi District, to the east by the Republic of Togo, and to the west by Krachi East Municipal. The Municipality has a land surface area of 2,733km2 (14.7% of the total land area of the region), which is the largest in the Volta Region. The total population of the Municipality as of 2020, as projected, is 149,296 with an estimated population growth rate of 2.5% (based on the Regional and National growth rate as released by the Ghana Statistical Service (GSS). This consists of 49.5% males and 50.5% females. The major ethnic groups in the Municipality are the Ntrubo, the Adele, the Atwode, the Challa, and the Konkomba. The rest are the Ewe, the Akan, the Kotokoli, and the Basare (Ghana Statistical Service, 2010). The study found that about 2.0 percent of the municipality's total population has one form of disability or the other. The proportion of males with a disability is slightly higher (2.2%) than females (1.8%). The types of disability in the district include sight, hearing, speech, physical, intellectual, and emotional. Persons with sight disability recorded the highest of 24.9 percent, followed by physical disability (24.3%). About 1.4 percent of the population in urban localities has a disability. There are more males with sight disability than females in both the urban and rural localities. Again, of the population with disabilities, 75.6 percent have never been to school. Agriculture, hunting, and forestry at the subsistence level are the main economic activities in the municipality, with minimal activities in secondary and tertiary sectors (Figures 1 and 2).

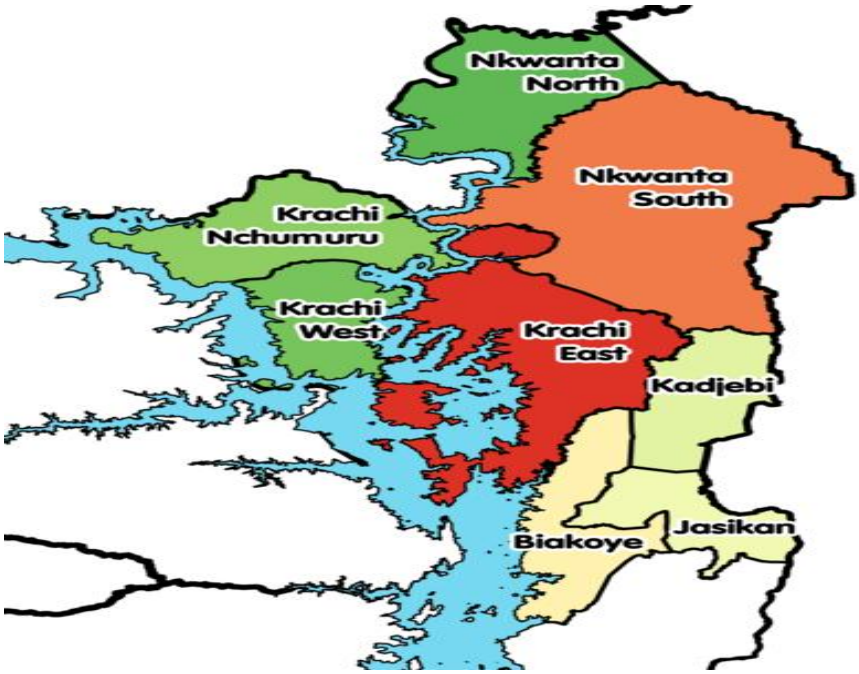


Figure 1: Map of Oti Region, where Nkwanta South can be located: 2018

Figure 2: Map of Nkwanta South Municipal, 2018

Target Population

The study specifically targeted school teachers within the 61 public schools, who taught at the basic school level in the Municipality.

Inclusion and Exclusion Criteria

Specifically, basic school teachers with two or more years of experience at the kindergarten, lower, and upper primary levels were considered for the study. This choice was based on the premise that such a category of teachers has had an enormous level of experience with children. The aforementioned category of teachers was also considered for the study because dysgraphia is a neuro-developmental condition, which occurs mostly among pre-school and primary school children (Chung and Patel, 2015). All other manners of teachers, characteristically different from the above prescription, were excluded from the study.

Sampling and Sample Size

Data obtained from the Nkwanta South Municipal Directorate of Education indicated that there were 130 teachers at the preschool and primary levels in the 8 communities selected for the study. Out of this number, 98 teachers representing 75% were selected through stratified probability sampling. Below is the statistical formula for the sample size:

$$n = \frac{N}{1+ N\,(e^2)}$$

Where n =sample size, N = population, and e = confidence level (95% confidence level). The choice of stratified random sampling was based on the necessity for teachers in each of the 8 educational circuits in the municipality to be represented in the study.

Data Tools

Data were obtained through the administration of closed-ended questions. The questions were designed based on the objectives of the study and were grouped under four (4) main sections: demographic features of the respondents, teachers' knowledge of dysgraphia identification, teachers' knowledge of support services, and perceived barriers to teaching children with dysgraphia. The data collection tools were coded to ensure anonymity.

Data Collection Procedure

After explaining the purpose of the study to the participants and receiving their consent, the researchers administered the questionnaires face-to-face with the respondents. This was to explain the questions well to the teachers for their decision on optional responses to choose from, and also to safeguard against double imputation of responses in the Google form. The respondents were also educated on the risk of contamination in research. They were therefore advised not to discuss the questions with their colleagues who were yet to be interviewed.

Data Management and Analysis

The data was cleaned and inputted in Statistical Package for Social Sciences (SPSS) version 17. The data was checked and re-checked for accuracy and analyze decriptively in the form of frequency tables and graphical representations.

Ethical Considerations

Ethical clearance was sought from the Kwame Nkrumah University of Science and Technology office of the Committee on Human Research, Publication, and Ethics, prior to the beginning of the study. Additionally, by the requirements for conducting research in Ghanaian public schools, permission was also sought from the Nkwanta South Municipal Directorate for Education, as well as the Heads of the individual Schools from which the Teachers were selected. The teachers who were the participants were given a participant information leaflet and an informed consent form to read and sign, respectively. The purpose of the research was, therefore, explained to the teachers. The study followed all the ethical considerations in relation to respondent selection, interview process, right of withdrawal during the interview process, confidentiality, data management, and data analysis protocols.

RESULTS

Study Locations and Number of Respondents Selected

The study was conducted in eight (8) communities in the Nkwanta North South District in the Volta Region. Figure 3 presents the number of respondents selected from each community, with Nkwanta East recording the highest number.

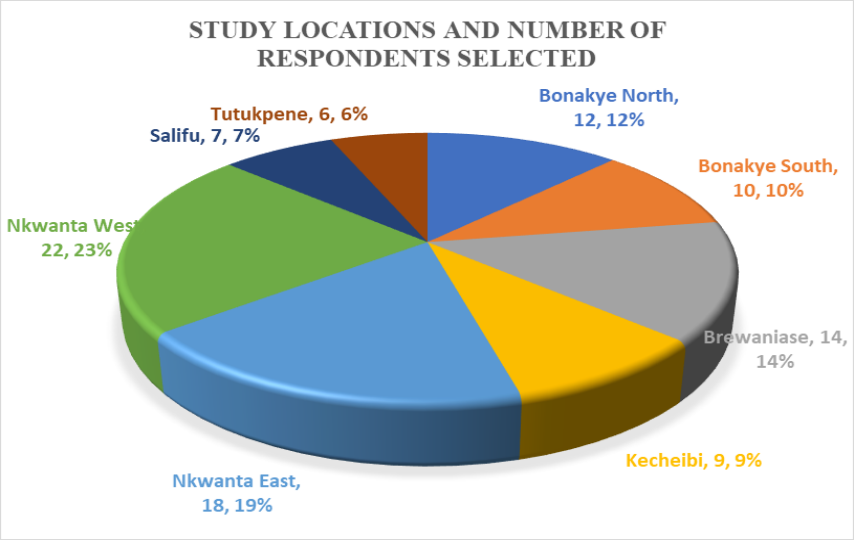


Figure 3: Study Locations and Number of Respondents Selected.

Socio-demographic characteristics of Study participants

The socio-demographic characteristics of respondents were also noted and reported. Among these are age, gender, professional qualifications, teaching experience, and level of teaching. The study noted that males' representation dominated (57.1%). Also, 51% of the teachers were between 30-39 years of age. Moreover, 52% of the teachers held diploma certificates, and only about 7.1% had training in Special Education. Again, 37.6% of the teachers had 7-9 years of teaching experience, and 52 % of the teachers were handling upper primary, as shown in Table 1.

Table 1: Socio-demographic characteristics of respondents

Variable (Category)	Frequency	%
Gender		
Male	56	57.1
Female	42	42.9
Age		
20-29	37	37.8
30-39	50	51.0
40-49	10	10.2
50+	1	1.0
Professional Qualification		
Certificate	1	1.0
Diploma	51	52.0
Bachelor's degree	33	33.7
Degree in Special Educ.	7	7.1
Masters	4	4.1
Others	2	2.0
Teaching Experience		
1-3 years	16	16.3
4-6 years	31	31.6
7-9 years	37	37.6
10 years and above	14	14.3
Level of Teaching		
Kindergarten	4	4.1
Lower Primary	43	43.9
Upper Primary	51	52.0

Teachers' Knowledge of Dysgraphia

The study researched into the knowledge of teachers about dysgraphia. It was found that only 25.4% of teachers knew that children with dysgraphia have extreme spelling errors as compared to the expectations for their grade level. Again, the study outcome revealed that only 33.7% of teachers knew that children with dysgraphia had an awkward grip of a pen or pencil. However, 86.6% and 94% of the teachers knew that children with dysgraphia write letters or words with irregular spacing and have bad writing skills, respectively, as shown in Figure 4.

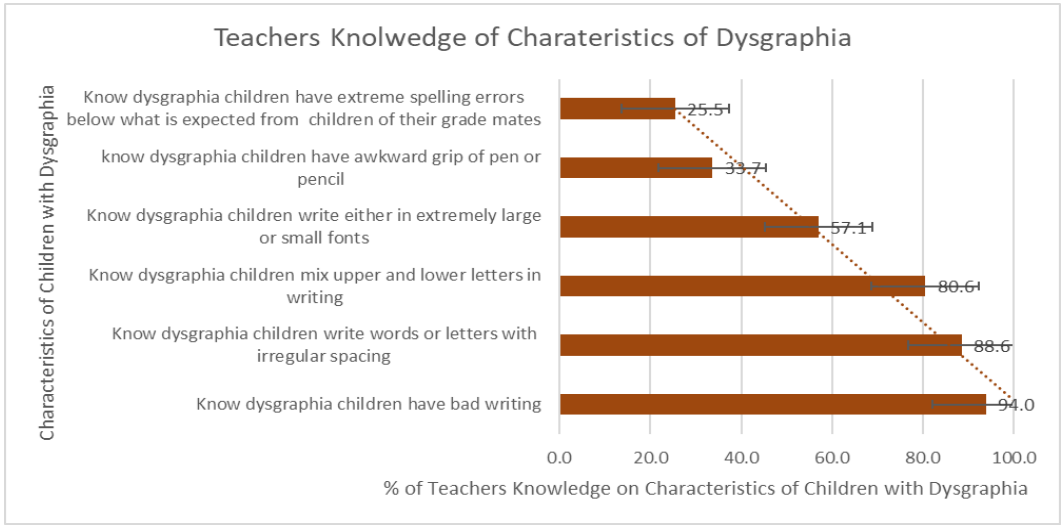


Figure 4: Knowledge of Teachers on Characteristics of Dysgraphia

Teachers' Knowledge of Sources of Information on Dysgraphia

The findings showed that the internet (42.3%) was the most widely used medium for accessing information on dysgraphia, as represented in Figure 5.

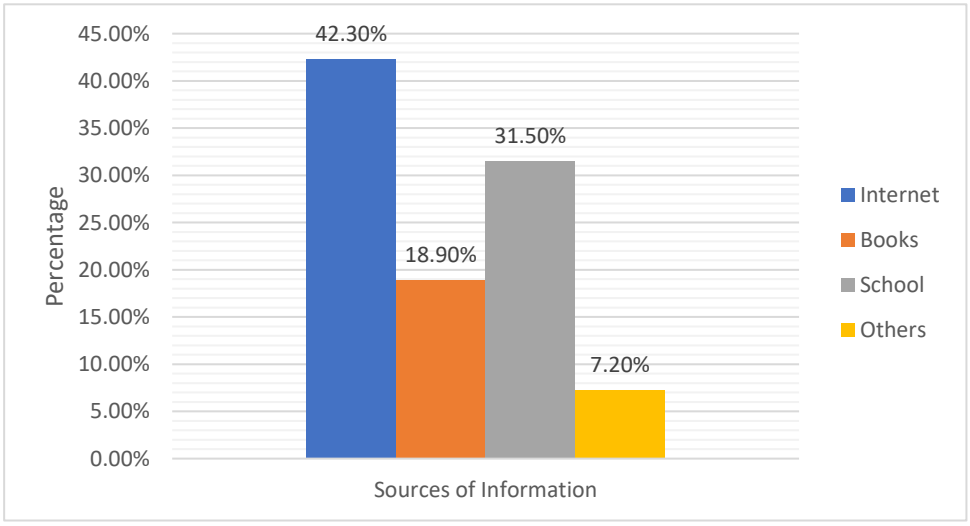
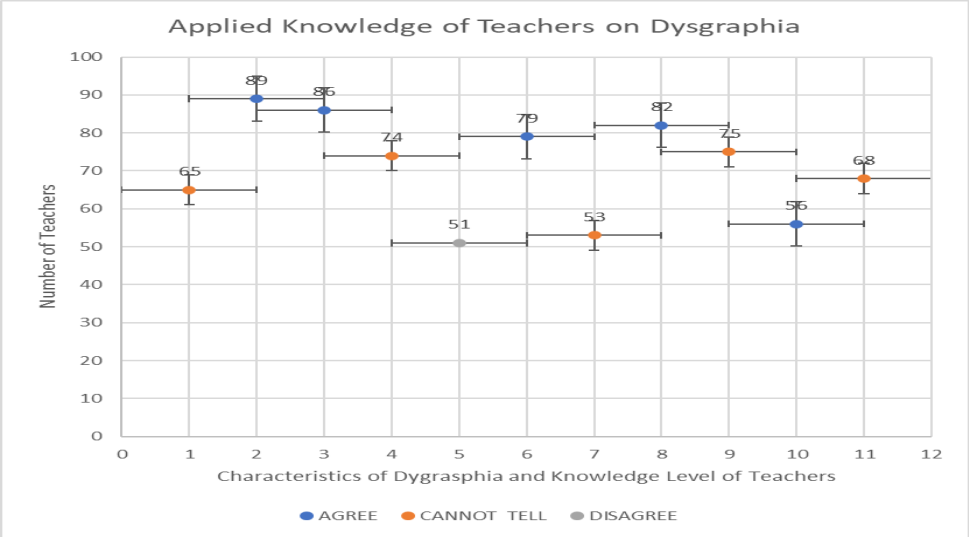


Figure 5: Teachers Knowledge of Sources of Information on Dysgraphia.

Applied Knowledge Teachers on Dysgraphia

Using the highest response rate among three variables (Agree, Cannot Tell / Neutral, Disagree) on the characteristics of dysgraphia represented in the graph (Figure 6) and in Table 2 with serial numbers (1-11), the study found that 89 teachers with knowledge ap-

plication agreed that children with dysgraphia produce generally illegible writings. Similarly, 86 teachers also agreed that children with dysgraphia write with unfinished words. Most teachers, concerning serial numbers 1, 4, 7, 9 and 11 (dysgraphia characteristics), could not make their knowledge known (cannot tell /neutral responses) as shown in Figure 6 or Table 2. In all, 51 teachers, however, disagreed that children with dysgraphia write without punctuation, capitalization, and paragraph indentation.



Notes: 1= awkward pen or pencil grip, 2 = illegible writings, 3 = unfinished words, 4 = significant spelling errors on grade level words, 5 = without punctuation, capitalization, and paragraph indentation, 6 = mixture of upper- and lower-case letters, 7 = difficulty getting thoughts onto paper, 8 = words or letters with irregular spacing, 9= hand discomfort when writing, 10= small or too large for reading, 11= take a longer time to complete a sentence when writing

Table 2: Absolute Representation of Characteristics of Dysgraphia above.

Serial Numbers Representing Characteristics of Dysgraphia	Dysgraphia Characteristics	Agree	Cannot Tell / Neutral	Disagree
1	Dysgraphia is characterized by an awkward pen or pencil grip	-	65	-
2	Children with dysgraphia produce illegible writing	89	-	-
3	Children with dysgraphia write with unfinished words	86	-	-
4	A child with dysgraphia makes a number of significant spelling errors on grade-level words	-	74	-
5	A child with dysgraphia writes without punctuation, capitalization, and paragraph indentation	-	-	51
6	A child with dysgraphia writes with a mixture of upper- and lower-case letters	79	-	-
7	A child with dysgraphia has difficulty getting thoughts onto paper	-	53	-
8	A child with dysgraphia writes words or letters with irregular spacing	82	-	-
9	A child with dysgraphia complains about hand discomfort when writing	-	75	-
10	Children with dysgraphia write too small or too large for reading	56	-	-
11	Children with dysgraphia take a longer time to complete a sentence when writing	-	68	-

Relationship between the level of professional qualification and knowledge of dysgraphia

As indicated in Table 3, there was a link between the level of qualification of the teachers and their knowledge about dysgraphia. Teachers with a master's degree and a bachelor's degree in special education tend to have higher knowledge about dysgraphia than those with lower qualifications (certificate and diploma in education).

Table 3: Professional Qualification of Respondents and their Knowledge about Dysgraphia

Knowledge about characteristics of children with dysgraphia	Ratings	Professional qualification					
		Certificate	Diploma	Bachelor's degree	Degree in special education.	Master's degree	Others
Awkward pen or pencil grip (n=98)	Agree	-	2(3.9%)	9(27.3%)	7(100%)	3(75%)	-
	Neutral	1(100%)	40(78.4%)	21(63.6%)	-	1(25%)	2(100%)
	Disagree	-	9(17.7%)	3(9.1%)	-	-	-
Significant spelling errors on grade level words (n=98)	Agree	-	-	10 30.3%)	7(100%)	4(100%)	-
	Neutral	-	49(96.1%)	23(69.7%)	-	-	1(50%)
	Disagree	1(100%)	2(3.9%)	-	-	-	1(50%)
Write without punctuation, capitalization, and paragraph indentation	Agree	-	9(17.6%)	15(45.5%)	7(100%)	4(100%)	-
	Neutral	1(100%)	6(11.8%)	3(9.1%)	-	-	2(100%)
	Disagree	-	36(70.6%)	15(45.5%)	-	-	-
Difficulty getting thoughts onto paper	Agree	-	14(27.5%)	20(60.6%)	7(100%)	2(50%)	-
	Neutral	1(100%)	35(68.6%)	13(39.4%)	-	2(50%)	2(100%)
	Disagree	-	2(3.9%)	-	-	-	-
Complaint about hand discomfort when writing	Agree	-	7(30.4%)	10(30.3%)	5(71.4%)	1(25%)	-
	Neutral	1(100%)	44(58.7%)	23(69.7%)	2(28.6%)	3(75%)	2(100%)
	Disagree	-	-	-	-	-	-
Take a longer time to complete writing a sentence	Agree	-	8(15.7%)	12(36.4%)	7(100%)	3(75%)	-
	Neutral	1(100%)	43(84.3%)	21(63.6%)	-	1(25%)	2(100%)
	Disagree	-	-	-	-	-	-

DISCUSSION

Males constituted the majority of the study respondents (57.1%), though the respondents were randomly selected. The selection outcomes justify the assertion that female teachers dominate the school staff list in urban as opposed to rural areas. Again, it was noted that bachelor's degree holders accounted for most of the respondents, as opposed to only 7.1% representing Special Education certificate holders. This may imply that not many teachers have been trained in Special Education in these communities. The study also found that the majority (94%) of the teachers knew dysgraphia. This is consistent with the study outcome of Madhamani & Joseph (2021), who reported that 45% of teachers

have adequate knowledge of learning disabilities, with 73% of the teachers admitting they have seen children with symptoms of learning disabilities. This, in general, has an implication for the management of children with learning disabilities, including dysgraphia, in the classroom. The study elicited from the teachers how they got information on dysgraphia. It turned out that 42.30% of the teachers get information from the internet, while 31.5% claim their school setting gave them much information. This may be related to few teachers are trained in Special Education.

Moreover, 89 teachers with the knowledge application assessment agreed that children with dysgraphia produce illegible writing. This is consistent with the study results of Chung, et al., (2020), who reported that, despite exposure to adequate instruction, children with dysgraphia demonstrate writing ability discordant with their cognitive level and age. Similarly, 86 teachers also agreed that children with dysgraphia write with unfinished words. This corroborates the findings of Csillag (2015), who reported in a Special Education course that children with dysgraphia are unable to complete most of their writing tasks. Most teachers, in relation to serial numbers 1, 4, 7, 9, and 11 (dysgraphia characteristics), did not make their knowledge known (cannot /neutral tell responses). This outcome is similar to the study finding from Kenya, where most teachers did not have training in special education and faced difficulties managing children with learning disabilities (Madrine, 2015). This assertion also confirms the outcome of a study on pre-experimental awareness conducted among 40 primary school teachers in Chennai, and evidence shows that 90% of the primary school teachers had inadequate awareness, and 10% had a moderate level of awareness on learning disabilities (Ambika, 2019).

Relating to sources of information, the study found that 42.3% of the teachers obtained information through the internet. Even though the internet may provide a reliable source of information, it was expected that teachers would have been equipped with knowledge about such a learning disability through formal training, by which they obtained their certificates. These findings differ from the outcome of a related study by Acheampong et al. (2019), which showed that 62% of teachers teaching children with dyslexia in the Asokwa Municipality of the Ashanti Region obtained their knowledge on the learning disability through formal training.

The current study also found that teachers with master's and bachelor's degrees in special education tend to have higher knowledge about dysgraphia than those with lower qualifications (certificate and diploma in education). This outcome may obviously be due to their training curriculum, which may not be available to non-special education teachers. Most of the study findings implied that, majority of teachers have limited knowledge of the characteristics of children with dysgraphia.

CONCLUSIONS

The study sought to assess the knowledge of basic school teachers in identifying children with dysgraphia in the Nkwanta South Municipality in Ghana. The study concludes that few teachers have adequate knowledge about the characteristics of children with dysgraphia, which is a reflection of their 'cannot tell/neutral' responses illustrated in Figure 6 or Table 2 with serial numbers 1, 4, 7, 9, and 11 (dysgraphia characteristics). However, the study noted that the majority of the teachers superficially know about the existence of dysgraphia as a learning disability. Again, though few teachers had information on dysgraphia by virtue of their special training, the majority had information on dysgraphia from the internet. Finally, the study concluded that the nature of training and certificates held by teachers has implications for their knowledge of learning disabilities such as dysgraphia.

RECOMMENDATIONS

- The study recommends that some special education topics should be included in all levels of educational curriculum to give insight to teachers who may encounter children with dysgraphia in their class.
- Teachers and School Health Coordinators should conduct regular screening to identify children with learning disabilities on time for appropriate medical and training needs.
- Ghana Education Services, in collaboration with other agencies, such as the Ministry of Health, NGOs, among others, should jointly organize in-service training on learning disabilities for teachers.

Implications for Disability Studies

- Dysgraphia in children's talents may be lost if not managed.
- Dysgraphia in children may lack logical thought if not managed.
- Sense of measurement may also be a problem for children with dysgraphia.
- The need for sustained therapies is key in correcting children with dysgraphia.

Limitations

Children with dysgraphia were not directly involved in the study. It would have presented a good perspective if some of them were made to write sentences, and a photograph or video taken and published with this manuscript.

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Availability of data and materials

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Authors' contributions

IO led the background development, literature review, and proofreading of the paper. **PEA** developed the methodology and was involved in fieldwork. **JKB** involved a literature review and data analysis. All authors were involved in writing the report on this paper. All authors therefore read and approved the final manuscript.

Consent for publication

All authors have fully consented to this paper being published.

Competing interests

The authors declare that they have no competing interests.

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